“Synthesis Of Novel Schiff Bases from Substituted Imidazole and their Transition metal Complexes with Pharmacological Application”

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Introduction:

Schiff bases are condensation products of primary amines with carbonyl compounds and they were first reported by Schiff [1] in 1864. The common structural feature of these compounds is the azomethine group with a general formula RHC=N-R1, where R and R1 are alkyl, aryl, cyclo alkyl or heterocyclic groups which may be variously substituted. These compounds are also knows as anils, imines or azomethines. Several studies [2-8] showed that the presence of a lone pair of electrons in an sp2 hybridized orbital of nitrogen atom of the azomethine group is of considerable chemical and biological importance. Because of the relative easiness of preparation, synthetic flexibility, and the special property of C=N group, Schiff bases are generally excellent chelating agents,[6-12] especially when a functional group like –OH or –SH is present close to the azomethine group so as to form a five or six membered ring with the metal ion. Versatility of Schiff base ligands and biological, analytical and industrial applications of their complexes make further investigations in this area highly desirable. Schiff bases have been known since 1864 when Hugo Schiff reported the condensation of primary amines with carbonyl compounds. Nowadays, the research field dealing with Schiff base coordination chemistry has expanded enormously. The importance of Schiff base complexes for bioinorganic chemistry, biomedical applications, supramolecular chemistry, catalysis and material science, separation and encapsulation processes, and formation of compounds with unusual properties and structures has been wellrecognized and reviewed (2). Schiff bases resulted from aromatic aldehydes ortho-substituted with a hydroxyl group have initially arouse the researchers' interest because of their ability to act as bidentate ligands for transitional metal ions 1 2011 International Conference on Chemistry and Chemical Process IPCBEE vol.10 (2011) © (2011) IACSIT Press, Singapore [16-20]. Later, in studies concerning quantitative structure-antitumor activity relationship of a series of Schiff bases derived from variously substituted aromatic amines and aldehydes, it has been shown that azomethines from salicylaldehydes gave the best correlation [21, 22]. Schiff bases of salicylaldehydes have also been reported as plant growth regulators [23] and antimicrobian [24] or antimycotic [25] activity. Schiff bases also show some analytical applications [26]. Schiff Bases are characterized by the -N=CH- (imine) group which imports in elucidating the mechanism of transamination and rasemination reaction in biological system [27,

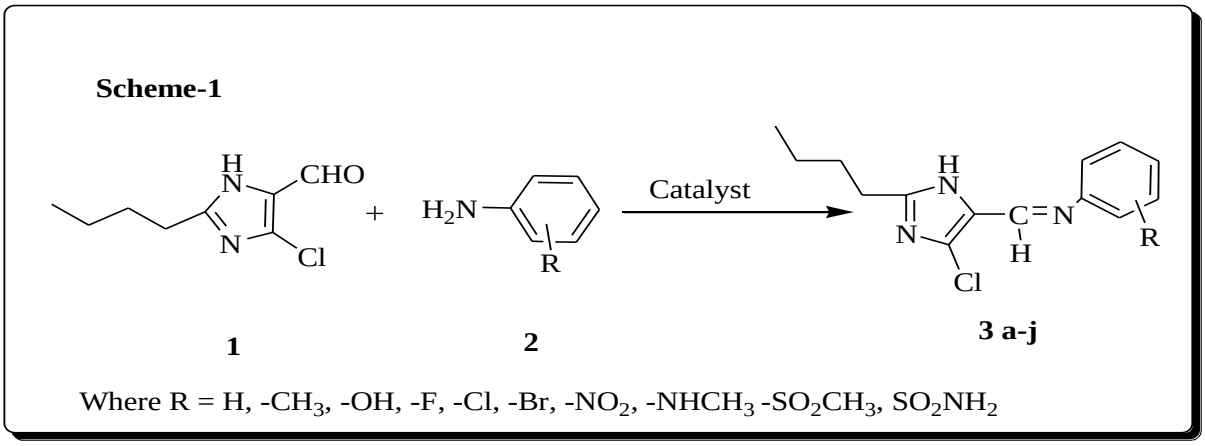
28]. Schiff bases are active against a wide range of organisms for example; Candida Albicans, Escherichia coli Staphylococcus aureus, Bacillus polymxa, Trychophyton gypseum, Mycobacteria, Erysiphe graminis and Plasmopora viticola. A large number of different Schiff base ligands have been used as cation carriers in potentiometric sensors as they have shown excellent selectivity, sensitivity, and stability for specific metal ions such as Ag(II), Al(III), Co(II), Cu(II), Gd(III), Hg(II), Ni(II), Pb(II), Y(III), and Zn(II) [29-34]. Schiff bases have been studied for their important properties in catalysis [35]. They show catalytic activity in hydrogenation of olefins [36]. They find applications in biomimetic catalytic reactions. An interesting application of Schiff bases is their use as an effective corrosion inhibitor, which is based on their ability to spontaneously form a monolayer on the surface to be protected. Many commercial inhibitors include aldehydes or amines, but presumably due to the C=N bond the Schiff bases function more efficiently in many cases [37]. The principal interaction between the inhibitor and the metal surface is chemisorption [38]. The inhibitor molecule should have centers capable of forming bonds with the metal surface by electron transfer. In such cases the metal acts as an electrophile and the inhibitor acts as a Lewis base. Nucleophilic centers, such as oxygen and nitrogen atoms, of the protective compound have free electron pairs which are readily available for sharing. Together with the atoms of the benzene rings they create multiple absorption sites for the inhibitor thus enabling stable monolayer formation [39]. Imines also have biological importance. An imine linkage between the aldehyde derived from vitamin A and the protein opsin in the retina of the eye plays an important role in the chemistry of vision. Vitamins are also called coenzymes, meaning that they are to the functioning of many enzymes, which are large proteins that catalyze chemical changes in cell. An example of a biologically important aldehyde is pyridoxal phosphate, which is the active form of the vitamin B6. Vitamin B6 serves as a coenzyme by forming an imine with an amino acid grouping an enzyme. The coenzyme, bound to the enzyme, is involved in transamination reaction, the transfer of the amino group from one amino acid to another, which is important in the metabolism and the biosynthesis of amino acids. In the last step, enzyme-catalyzed hydrolysis cleaves the imine to pyridoxal and the modified amino acid. Schiff bases have been reported in their biological properties, such as, antibacterial, antifungal activities [40-43]. Their metal complexes have been widely studied because they have anticancer and herbicidal applications [44, 45]. They serve as models for biologically important species.

Proposed work

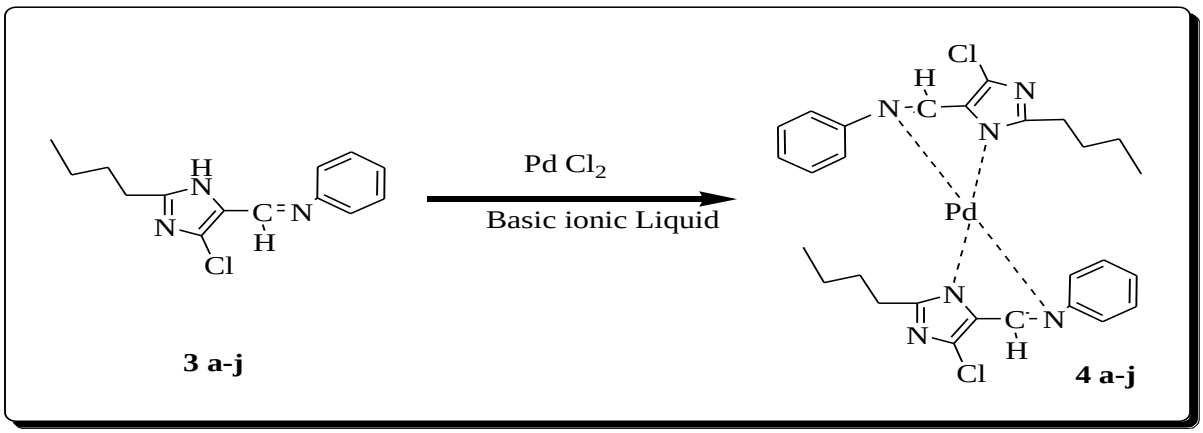
Methodology

All Schiff bases as well as their complexes synthesis carried out by using Imidazolium based Ionic liquids

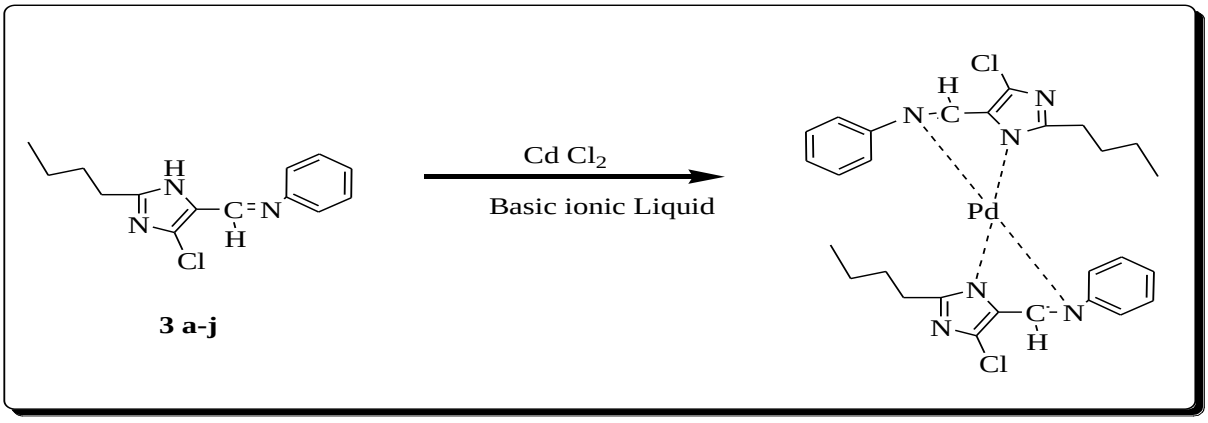
Scheme 1. Synthesis of Schiffs bases



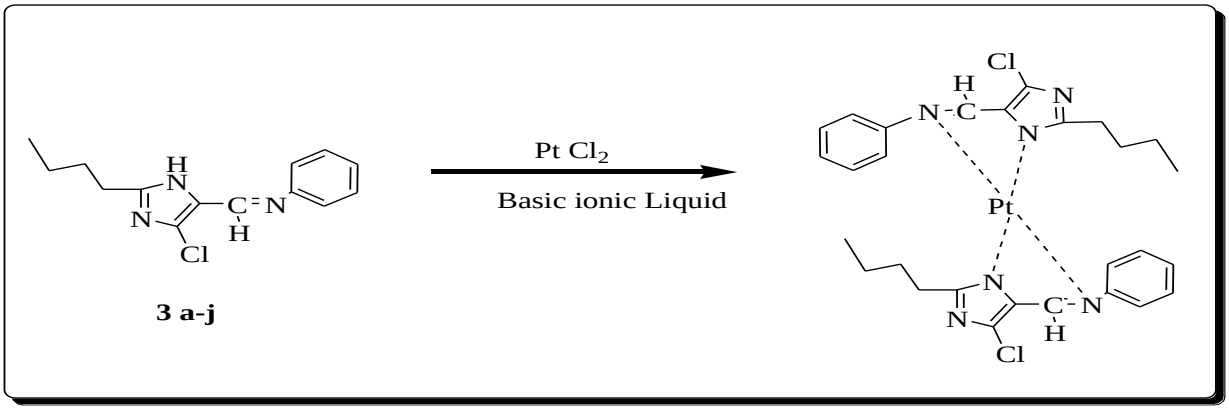
Scheme 2. Synthesis of Palladium Complexes 4 a-j



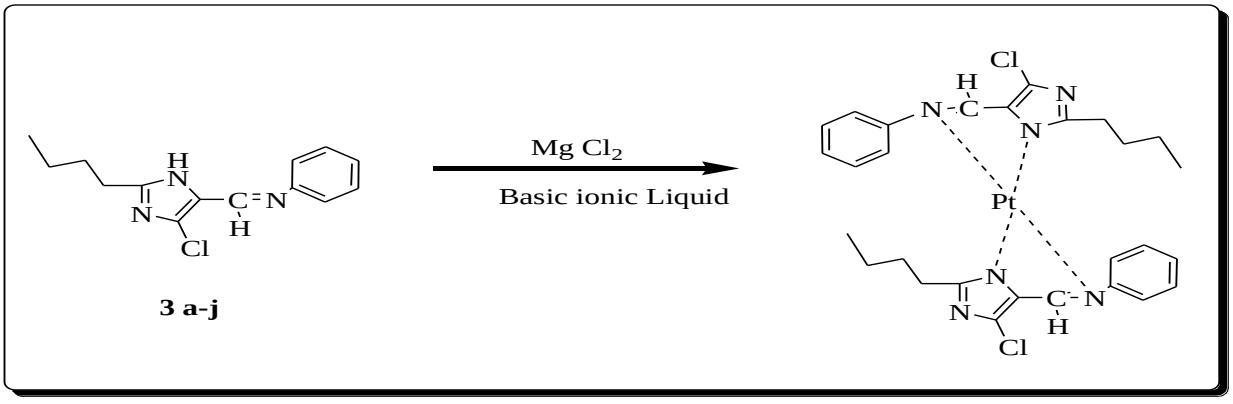
Scheme 3. Synthesis of Cadmium Complexes 5 a-j



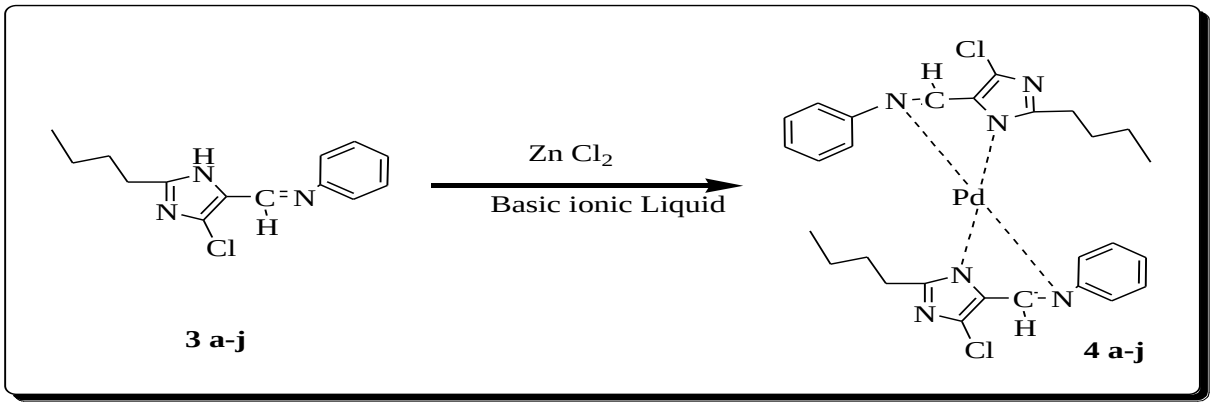
Scheme 4. Synthesis of Platinum Complexes 6 a-j



Scheme 5. Synthesis of Magnesium Complexes 7 a-j



Scheme 6. Synthesis of Cadmium Complexes 8 a-j



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